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ABSTRACT

A project identified instructional objectives in the "Basic Program of Vocational Agriculture in Louisiana" curriculum guide which teach a substantial amount of science. It also determined the amount of time spent in vocational agriculture programs in Louisiana on science-related vocational agriculture instruction. The research staff examined the Agriculture I and Agriculture II curriculum to determine overlapping objectives taught in both vocational agriculture and high school science classes. Vocational agriculture teachers and high school science teachers validated the identification of the science-related instructional objectives. A total of 76 instructional objectives were identified as being science related. This report summarizes the science-related instructional objectives taught in vocational agriculture during the freshman and sophomore years. Information is presented correlating the agricultural instructional objective with one or more science courses taught in Louisiana public schools. Information is also presented showing the relationship between agricultural instructional objectives and science objectives for each science course investigated in the study--biology, chemistry, earth science, environmental science, general science, physical science, and physics. (YLB)

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ED284010

IDENTIFICATION OF SCIENCE-RELATED COMPETENCIES
TAUGHT IN VOCATIONAL AGRICULTURE PROGRAMS IN LOUISIANA

PROJECT DIRECTOR:

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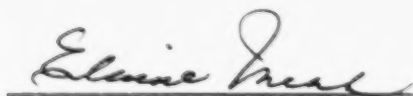
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A handwritten signature in cursive script, reading "Elaine Webb", is written over a horizontal line.

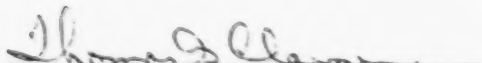
Elaine Webb, Ed.D.
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FOREWORD

This research report identifying science-related competencies taught in vocational agriculture programs was produced as a result of a project funded by the Louisiana State Department of Education to Louisiana State University, Baton Rouge, Louisiana. The results of this project were obtained through a cooperative effort between the research staff at Louisiana State and high school vocational agriculture and science teachers.

An extensive review of the state-adopted science curricula in biology, chemistry, earth science, environmental science, general science, physical science, and physics was performed by the project staff. Similarly, the curriculum guide for the Basic Program of Vocational Agriculture in Louisiana (Bulletin 1690-I) was examined. A substantial amount of overlapping subject matter was discovered and is the focus of this research report.

An outcome of this research effort will be an increased awareness of the similarity between the objectives taught in high school science and vocational agriculture. The results are important to teacher educators, state department personnel and vocational teachers as they seek to improve instruction in vocational education courses within the state.


Thomas G. Clausen, Ph.D.
State Superintendent of Education

Identification of Science-Related Competencies Taught
in Vocational Agriculture Programs in Louisiana

In recent years, there has been considerable attention given to the improvement of student competence in the field of science at the secondary school level. Many states have mandated revisions in the high school curricula so as to increase the required number of science credits needed for graduation. Typically, these revisions have meant that high school students would enroll in additional science courses such as general science, biology, or chemistry. As the number of required courses has increased, the number of elective courses available to the student has simultaneously decreased.

In most cases, vocational education courses are considered as elective courses. Consequently, enrollments in vocational education have decreased as the number of required high school courses has increased. Until recently, little consideration has been given to the potential for teaching science competencies in other than traditional science courses. However, some states are examining vocational education courses such as vocational agriculture for use as a means of teaching science competencies to high school students.

The purpose of this project was to identify instructional objectives in the Basic Program of Vocational Agriculture in Louisiana which teach a substantial amount of science and to determine the amount of time spent in vocational agriculture programs in Louisiana on science-related vocational agriculture instruction. The project involved an examination of the Agriculture I and Agriculture II curriculum by the research project staff to determine overlapping objectives taught in both vocational agriculture and high school science

classes. Vocational agriculture teachers and high school science teachers were used to validate the identification of the science-related instructional objectives.

Objectives

In order to achieve the purpose of the study, the following objectives served as guidelines in the performance of the project.

1. To select a sample of vocational agriculture teachers knowledgeable of the instructional objectives in the Basic Program of Vocational Agriculture in Louisiana.
2. To select a limited number of personnel knowledgeable of the instructional objectives taught in high school science courses.
3. To determine those agricultural objectives which overlap with objectives taught in high school science courses.
4. To determine the amount of time spent teaching agricultural objectives that contain a substantial amount of science-related instruction.

Procedures

To accomplish the objectives previously outlined, an advisory committee assisted the researcher in the administration of the project. Louisiana vocational agriculture teachers were selected by a method of random sampling to participate in the study. Input from these teachers were sought to determine science-related instructional objectives and time spent on science-related instruction.

Louisiana science teachers were identified as the personnel knowledgeable of the instructional objectives taught in high school science. The state-adopted curricula for the high school science courses, biology, chemistry, earth science, environmental science, general science, physics, and physical science, were used as the source for identifying the instructional objectives taught in high school science programs. A science teacher then used the information from the curriculum outlines for agriculture and science to select possible objectives in agriculture that were science related.

A survey instrument was developed and sent to the sample of vocational agriculture teachers to validate the list of science related objectives. Additionally, the vocational agriculture teachers were surveyed to determine the amount of time spent teaching the science-related agricultural objectives.

Results

A total of 76 instructional objectives from the Basic Program of Vocational Agriculture in Louisiana curriculum guide were identified as being science related. A complete listing of the results of the competency identification is summarized for each science area taught in Louisiana. Of the 76 instructional objectives identified, 13 objectives were overlapping with objectives taught in high school biology. Four objectives overlap with objectives taught in general science and three objectives are similar to the competencies taught in physical science.

Many of the instructional objectives in the soil science unit of the Basic Program of Vocational Agriculture in Louisiana were similar to

objectives taught in earth science. A total of 12 agricultural instructional objectives were judged to be overlapping. Additionally, there were four objectives from the soil science units that were also taught in high school physics courses.

The greatest similarity between the curricula in vocational agriculture and a specific high school science course is in environmental science. Fifty-four agricultural instructional objectives from the Basic Program of Vocational Agriculture in Louisiana were of similar content to the objectives taught in environmental science.

The science related agricultural instructional objectives taught in vocational agriculture during the freshman and sophomore years are summarized on the following pages. Information is presented identifying the agricultural instructional objective with one or more science courses taught in Louisiana public schools. Information is also presented showing the relationship between agricultural instructional objectives and science objectives for each science course investigated in this study.

SUMMARY OF SCIENCE-RELATED AGRICULTURAL COMPETENCIES IN THE BASIC PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA

			AGRICULTURAL INSTRUCTIONAL OBJECTIVES
*			Define new plant science terms.
*			List the parts of the plant and identify their functions.
*			Describe the history of crop improvement.
*			Identify causes of disease.
*			Identify by name the various parts of livestock and poultry.
*			Identify by locations the various parts of livestock and poultry.
*			List the six classes of nutrients.
*			Identify the function of nutrients.
*			Outline the classification and nomenclature of feedstuffs.
*			Identify the sources of feedstuffs representing essential elements.
*	*		Label and define essential parts of the digestive system.
*	*		List the anatomy and functions for the male and female.
*	*		Describe the reproductive process for mammals and poultry.
*	*	*	Define electrical terms.
		*	Name the two basic types of circuits.
		*	Identify the types of conductors and insulators.

SUMMARY OF SCIENCE-RELATED AGRICULTURAL COMPETENCIES
IN THE BASIC PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA

			-----Earth Science
			-----Environmental Science
			-----Chemistry
			-----Physics
*	*		Define soil.
*	*		Distinguish between surface soil and subsoil.
*	*		Identify the six main soil areas in Louisiana.
*	*		Describe a soil profile.
*	*		Identify the various soil horizons in a soil profile.
*	*		Describe soil formation.
*	*		List the factors responsible for soil formation.
*	*		Name the factors of most influence on soil formation.
*	*	*	Demonstrate the water holding capacities of soils.
*	*	*	Determine soil water availability.
*	*	*	List the ways available water can be lost by soils.
*	*	*	Name factors important in determining water movement in soil.
*	*	*	Make chart of pH scale to show acidity and alkalinity.
*	*	*	Make laboratory tests for acidity of common products.
*	*	*	Explain how calcium affects soil acidity and availability of elements.
*	*	*	Explain how pH symbols are used in denoting acidity/alkalinity.
*	*	*	Describe the conditions that lead to soil acidity/alkalinity.
*	*	*	List the pH ranges of the major crops.
*	*	*	Explain where energy comes from to carry out nitrogen transformations.
*	*	*	Name one type of bacteria involved in the nitrogen cycles.
*	*	*	Discuss the symbiotic relationship between bacteria and plants.
*	*	*	Specify where the bacteria are located in the root of plants.
*	*	*	Discuss nitrogen fixation.
*	*	*	Describe components of plant's underground environment.
*	*	*	Describe components of plant's above ground environment.
*	*	*	List the optimum growth conditions for different plants.
*	*	*	Explain how plants obtain carbon, oxygen, hydrogen, and nitrogen.
*	*	*	Describe the nitrogen cycle.
*	*	*	List some sources of inorganic fertilizers.

12

RELATIONSHIP BETWEEN AGRICULTURAL INSTRUCTIONAL OBJECTIVES AND
SCIENCE COMPETENCIES IN BIOLOGY*

BIOLOGY

<u>Agricultural Instructional Objectives</u>	<u>Science Objectives</u>
Define new plant science terms.	→ → → B. 9 Describe photosynthesis. B. 10 Describe respiration. B. 31 Explain transpiration in plants.
Describe the history of crop improvement.	→ B. 18 Identify Gregor Mendel as the father of heredity and describe his laws of inheritance.
Identify causes of disease.	→ B. 22 Distinguish the three basic shapes of bacteria.
List the parts of the plant and identify their functions.	→ → → → B. 26 Identify the three main parts of a plant as the root, stem, and leaf. B. 27 Define main function of the root. B. 29 Identify xylem and phloem and their functions. B. 30 Define main function of the leaf.
Identify by name the various parts of livestock and poultry.	→ B. 33 Describe the parts of characteristics unique to mammals and birds.
Identify by location the various parts of livestock and poultry.	
Outline the classification and nomenclature of feedstuffs.	→ B. 36 Name the necessary nutrients in the diet and give the function of each.
Identify the sources of feedstuffs available representing the six essential nutrients for a feeding program.	
List the six classes of nutrients.	
Identify the function of nutrients.	

- Label and define essential parts of the digestive system (ruminants, non-ruminants, and poultry). → B. 37 List and identify the organs of the digestive system (human).
- List anatomy and functions for the male and female reproductive system (mammals and poultry). → B. 47 Label the basic anatomy of the male reproductive system.
- B. 48 Label the basic anatomy of the female reproductive system.
- Describe the reproductive process mammals and poultry. (Includes estrus, ovulation, fertilization, gestation.) → B. 49 Define specific events that occur during the menstrual cycle.

*Identified as objectives in the Biology Curriculum Guide, Office of Academic Programs, State of Louisiana, Department of Education.

RELATIONSHIP BETWEEN AGRICULTURAL OBJECTIVES AND
SCIENCE COMPETENCIES IN CHEMISTRY*

CHEMISTRY

Agricultural Instructional Objectives

Science Objectives

Make a large chart of the pH scale to show degrees of soil acidity and alkalinity.

Make laboratory tests for acidity of common products such as fresh milk, sour milk, orange juice, and lemon juice.

Explain how calcium affects soil acidity and the availability of other elements.

Explain how pH symbols are used in denoting the degree of acidity and alkalinity in soils.

Describe the conditions that lead to soil acidity or alkalinity.

List the pH ranges of the major crops.

C. 66 Classify solutions of various substances as acidic, basic, or neutral given their pH.

*Identified as objectives in the Chemistry Curriculum Guide, Office of Academic Programs, State of Louisiana, Department of Education.

RELATIONSHIP BETWEEN AGRICULTURAL INSTRUCTIONAL OBJECTIVES
AND SCIENCE COMPETENCIES IN EARTH SCIENCE

EARTH SCIENCE

<u>Agricultural Instructional Objectives</u>		<u>Science Objectives</u>
Describe soil formation.	}	S. 25 Demonstrate how chemical and physical weathering work together.
List the factors responsible for soil formation.		
Name the factors that exert the most influence on soil formation.	→	S. 26 Relate soil to weathering process.
Define soil.	}	S. 27 When given a diagram of a soil profile, recognize it as such; label the layers as topsoil, subsoil, and parent (weathered) rock; and tell in your own words why they are different.
Distinguish between surface soil and subsoil.		
Identify the six main soil areas in Louisiana and their uses.		
Describe a soil profile.		
Identify the various soil horizons in a soil profile.		
Demonstrate the water-holding capacities of sandy and clayey soils.	}	S. 28 Define permeability.
Determine soil water availability.		S. 29 Define porosity (compare permeability to porosity).
List ways available water can be lost by soils.		
Name the factors important in determining water movement in the soil.		

*Identified as objectives in the Earth Science Curriculum Guide, Office of Academic Programs, State of Louisiana, Department of Education.

RELATIONSHIP BETWEEN AGRICULTURAL INSTRUCTIONAL OBJECTIVES
AND SCIENCE COMPETENCIES IN ENVIRONMENTAL SCIENCE*

ENVIRONMENTAL SCIENCE

<u>Agricultural Instructional Objectives</u>		<u>Science Objectives</u>
Explain where the energy comes from to carry out the nitrogen transformations.	→	E. 13 The student will be able to differentiate between autotrophs, heterotrophs, and chemotrophs.
Name one common type of bacteria that is involved in the nitrogen cycle.		
Discuss the symbiotic relationship between bacteria and plants.		
Specify where the bacteria are located in the root of the plants.		
Discuss nitrogen fixation.		
Describe components of the plant's underground environment.	→	E. 14 The student will be able to identify the abiotic factors of the environment such as light, soil, space, air, nutrients, temperature, water and topography.
Describe components of the plant's aboveground environment.		
List optimum growth conditions for different types of plants.		
Explain how plants obtain carbon, oxygen, hydrogen, nitrogen, phosphorus, and potassium.	→	E. 24 The student will be able to recognize that biological systems are described as dynamic because the materials and energy involved are parts of continuous cycle.
List some sources of inorganic fertilizers.	→	E. 25 The student will be able to recognize that inorganic materials and energy become part of organic matter and are subsequently broken down into basic compounds.
List some sources of organic fertilizers.		

List ways chemicals can harm the environment.

List ways chemicals move through the environment.

Define residues.

Define tolerances.

Define soil.

Distinguish between surface soil and subsoil.

Identify the six main soil areas in Louisiana and their uses.

Describe a soil profile.

Identify the various soil horizons in a soil profile.

Describe soil formation. List factors responsible for soil formation.

Name factors that exert greatest influence on soil formation.

List chemicals and biological properties of soils.

Explain how chemical and/or biological properties affect each other and how they affect the nature and conditions of the soil.

Name the microorganisms that are found in the soil.

List the soil microorganisms that are beneficial to farmers.

Describe the role of higher forms of plant and animal life in the soil.

E. 27 The student will be able to recognize that the natural cycles and systems on Earth have limited capacity to cycle or disperse natural and/or manufactured pollutants.

E. 52 The student will demonstrate an understanding of soil formation by describing the physical, chemical, and biological processes involved in the formation of soil.

E. 53 The student will be able to identify, using drawings, the dominant organisms found in the are soil.

E. 54 The student will cite examples of ways in which living organisms in the top part of the soil affect the soil.

Make large chart of pH scale to show degrees of soil acidity and alkalinity.

Explain how calcium affects soil pH and availability of other elements.

Describe conditions that lead to high or low pH.

List pH range of major crops.

Interpret the organic matter content of the surface soil using soil color.

Distinguish between "light" and "heavy" soils.

Determine the texture of a soil sample.

Classify soil samples using the textural triangle as a guide.

E. 55 The students will identify the characteristics of a soil profile. These would include texture, pH, temperature and color.

Explain the effects of soil structure on productivity.

E. 56 The student will describe various factors affecting soil productivity.

State the management practices that should be followed to obtain maximum yields and proper soil conservation.

Determine the best possible use of land according to the soil depth, texture, permeability, slope, surface drainage, and degree of erosion.

E. 57 The students will give evidence to show how man has contributed to soil erosion.

E. 58 The student will give examples, causes, and result of natural erosion.

E. 59 The student will explain the necessity of erosion control by emphasizing the amount of soil lost annually.

List the farming types found in Louisiana and the United States.

State the approximate acreage used for producing each of these farm types.

E. 64 The student will compare the amount of land used for agriculture since 1900.

Identify the three groups into which the nutrient requirements of plants may be divided. Give examples of each type.

List the influence of nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur.

Identify and/or describe the deficiency symptoms caused by a lack of nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur.

E. 68 The student will describe the value of competent use of fertilizer to prevent crop yield decline.

Compare the advantages and disadvantages of organic and inorganic fertilizers.

E. 69 The student will realize the cost of energy in producing artificial fertilizers.

Identify harmful insects and describe how they are destructive.

List and discuss the reasons weeds are harmful.

Recognize and describe the symptoms and effects of major diseases on plants.

List signs of ill health and identify causes of disease.

E. 70 The student will list ways in which food production is destroyed by pests (undesirable organism).

Identify safety precautions to be used when applying herbicides.

List general safety precautions for mixing and applying pesticides.

List ways chemicals can harm the environment.

E. 72 The student will recognize that pesticides must be carefully used since they are detrimental to many species when used improperly.

Define residues.

Define tolerances.

E. 73 The student will define and differentiate between persistences and resistance in use of pesticides.

List and describe cultural practices that may be used to prevent plant disease.

List methods of disease control with chemicals.

E. 74 The student will list types of natural pest control methods and compare these effects to artificial pesticides.

List the ways chemicals move
through the environment.



E. 93 The student will locate
various sources of
agricultural water
pollutants and state
effects of the materials
on the environment.

List the name and characteristics
of the three major groups of
insecticides according to their
chemical makeup.



E. 202 The students will describe
pesticides used on crops
in Louisiana.

*Identified as as objectives in the Environmental Science Curriculum Guide
(Draft), Office of Academic Programs, State of Louisiana, Department of
Education.

RELATIONSHIP BETWEEN AGRICULTURAL INSTRUCTIONAL OBJECTIVES
AND SCIENCE COMPETENCIES IN GENERAL SCIENCE*

GENERAL SCIENCE

<u>Agricultural Instructional Objectives</u>	<u>Science Objectives</u>
Label and define essential parts of the digestive system, (ruminants, non-ruminants, and poultry).	G. 25 Describe the basic functions of the reproductive and digestive system.
List anatomy and functions for male and female reproductive system (mammals and poultry).	
Describe the reproductive process for mammals; for poultry. (Includes estrus, ovulation, fertilization, gestation).	
Define the following terms:	G. 31 Define ohms, amperes, volts, and watts as units of electricity.
1) Electricity	
2) Circuit	
3) Conductor	
4) Insulator	
5) Ampere	
6) Volt	
7) Ohm	
8) Watt	
9) Kilowatt-hour	
10) AC	
11) DC	

*Identified as objectives in the General Science Curriculum Guide, Office of Academic Programs, State of Louisiana, Department of Education.

RELATIONSHIP BETWEEN AGRICULTURAL INSTRUCTIONAL OBJECTIVES
AND SCIENCE COMPETENCIES IN PHYSICAL SCIENCE*

PHYSICAL SCIENCE

<u>Agricultural Instructional Objectives</u>	<u>Science Objectives</u>
Identify types of conductors and insulators. →	P. 36 Categorize materials as conductors and insulators.
Define the following terms:	
1) Electricity	
2) Circuit	
3) Conductor	
4) Insulator	
5) Ampere →	P. 38 List the components of electrical current including volt, ohm, and ampere.
6) Volt	
7) Ohm	
8) Watt	
9) Kilowatt-hour	
10) AC	
11) DC	
Name the two basic types of circuits. →	P. 39 Distinguish between alternating and direct current.

*Identified as objectives in the Physical Science Curriculum Guide, Office of Academic Programs, State of Louisiana, Department of Education.

RELATIONSHIP BETWEEN AGRICULTURAL INSTRUCTIONAL OBJECTIVES
AND SCIENCE COMPETENCIES IN PHYSICS*

PHYSICS

Agricultural Instructional Objectives

Science Objectives

Demonstrate the water-holding capacities of sandy and clayey soils.

Determine soil water availability.

List ways available water can be lost by soils.

Name the factors important in determining water movement in the soil.

Ph54 Explain the phenomena of surface tension and capillarity in terms of kinetic energy.

*Identified as objectives in the Physics Curriculum Guide, Office of Academic Programs, State of Louisiana, Department of Education.

The results of the competency identification component of the project revealed a substantial number of science-related instructional objectives as part of the Basic Program of Vocational Agriculture in Louisiana. To further document the teaching of these science-related instructional objectives, the vocational agriculture teachers indicated the amount of instructional time spent in teaching the objectives. It was determined that more than 70 hours of instruction is being spent on science-related agricultural objectives.

A summary of the average amount of time spent teaching the science-related objectives is presented for each unit of the vocational agriculture curriculum. An estimate is made of the time spent on science related instruction in both Vocational Agriculture I and Vocational Agriculture II.

AVERAGE AMOUNT OF TIME SPENT TEACHING SCIENCE RELATED
 AGRICULTURAL INSTRUCTIONAL OBJECTIVES IN THE SOIL
 SCIENCE UNIT OF THE BASIC PROGRAM OF
 VOCATIONAL AGRICULTURE IN LOUISIANA

<u>Agricultural Lesson</u>	<u>Hours of Instruction</u>	
	<u>Vo-Ag I</u>	<u>Vo-Ag II</u>
Definition of Soil -----	3.0	
Define soil		
Distinguish between surface and subsoil		
Identify main soil areas		
Describe a soil profile		
Identify various soil horizons		
Composition of Soil -----	2.5	
Identify the components of soil and factors that determine its productivity		
Factors Affecting Soil Formation -----	3.0	
Describe soil formation		
List factors responsible for soil formation		
Name factors of most influence on soil formation		
Physical Properties of Soils -----	4.5	
Interpret organic matter content		
Interpret internal drainage		
Distinguish between "light" and "heavy" soil		
Determine texture of soil sample		
Classify soil sample		
Explain effects of structure on productivity		
Chemical and Biological Properties -----	2.0	
of the Soil		
List chemical and biological properties		
Explain how chemical/biological properties effect each other		
Name the microorganisms in soil		
List beneficial microorganisms		
Describe role of plant life in soil		

Soil Acidity and Alkalinity -----	4.0	2.0
Make chart of pH scale		
Make lab tests for acidity		
Explain how calcium affects soil acidity		
Explain pH symbols		
Describe conditions for soil acidity/alkalinity		
List pH ranges of major crops		
Soil Classification -----	5.5	
State management practices to obtain proper soil conservation		
Determine best possible use of land according to soil factors		
Organic and Inorganic Fertilizers -----	5.0	
List sources of inorganic fertilizers		
List sources of organic fertilizers		
Describe nitrogen cycle		
Explain how plants obtain elements		
Explain where energy comes from in nitrogen transformation		
Name one type of bacteria in nitrogen cycle		
Discuss symbiosis and nitrogen fixation		
Classification - Water Holding Capacity -----	3.5	
of Soils		
Demonstrate water holding capacity		
Determine soil water availability		
List ways available water is lost		
Name factors important in water movement		
Total Hours of Instruction	19	16
		35 hours total

AVERAGE AMOUNT OF TIME SPENT TEACHING SCIENCE RELATED
 AGRICULTURAL INSTRUCTIONAL OBJECTIVES IN THE
 ORIENTATION UNIT OF THE BASIC PROGRAM OF
 VOCATIONAL AGRICULTURE IN LOUISIANA

<u>Agricultural Lesson</u>	<u>Hours of Instruction</u>	
	<u>Vo-Ag I</u>	<u>Vo-Ag II</u>
Farming Types in U.S. -----	2	
List farming types found in		
Louisiana and U.S.		
State approximate acreage for		
producing different crops		
Total Hours of Instruction	2 hours	

AVERAGE AMOUNT OF TIME SPENT TEACHING SCIENCE RELATED
 AGRICULTURAL INSTRUCTIONAL OBJECTIVES IN THE PLANT
 SCIENCE UNIT OF THE BASIC PROGRAM OF VOCATIONAL
 AGRICULTURE IN LOUISIANA

<u>Agricultural Lesson</u>	<u>Hours of Instruction</u>	
	<u>Vo-Ag I</u>	<u>Vo-Ag II</u>
Structure and Physiology of Plants -----	3.5	
Define new plant science terms		
List parts of the plant and		
identify their function		
Plant Nutrition -----	2.0	
Identify the three primary elements		
and function in plant growth		
Identify different conditions of		
plant when fertilizer is lacking		
Environmental Factors Affecting Plants ---	2.0	
Describe components of plants		
underground		
Describe components of plants		
above ground		
List optimum growth conditions		
for different plants		
Weed Control -----	3.0	
List and discuss the reason		
weeds are harmful		
Identify safety precautions		
when using herbicides		
List general precautions for		
mixing herbicides		
Insects Affecting Plants -----	2.0	
Identify harmful insects and		
discuss destructiveness		
List characteristics of major		
groups of insecticides by		
chemical make-up		
Seed and Plant Selection -----	1.0	
Describe the history of		
crop improvement		

Diseases Affecting Plants ----- 3.5

Recognize and describe the
symptoms and effects of
plant diseases

Total Hours of Instruction 10.5 6.5

16.5 total hours

AVERAGE AMOUNT OF TIME SPENT TEACHING SCIENCE RELATED
 AGRICULTURAL INSTRUCTIONAL OBJECTIVES IN THE
 ANIMAL SCIENCE UNIT OF THE BASIC PROGRAM OF
 VOCATIONAL AGRICULTURE IN LOUISIANA

<u>Agricultural Lesson</u>	<u>Hours of Instruction</u>	
	<u>Vo-Ag I</u>	<u>Vo-Ag II</u>
Parts of Livestock and Poultry -----	4.0	
Identify by name the various parts of livestock and poultry		
Identify by location the various parts of livestock and poultry		
Classification and Functions of Nutrients -----	2.0	
List the six classes of nutrients		
Identify the function of nutrients		
Sources of Nutrients -----	3.0	
Outline the classification and nomenclature of feedstuffs		
Identify the sources of feedstuffs representing essential elements		
The Digestive Process -----	1.5	
Label and define essential parts of the digestive system		
Reproduction of Livestock and Poultry -----	3.5	
List the anatomy and functions for the male and female		
Total Hours of Instruction	4.0	10
	14 total hours	

AVERAGE AMOUNT OF TIME SPENT TEACHING SCIENCE RELATED
 AGRICULTURAL INSTRUCTIONAL OBJECTIVES IN THE
 AGRICULTURAL MECHANICS UNIT OF THE BASIC
 PROGRAM OF VOCATIONAL AGRICULTURE
 IN LOUISIANA

<u>Agricultural Lesson</u>	<u>Hours of Instruction</u>	
	<u>Vo-Ag I</u>	<u>Vo-Ag II</u>
Electrical Terms -----	3.5	
Define electrical terms		
Name the two basic types		
of circuits		
Identify the types of conductors		
and insulators		
Total Hours of Instruction	3.5 hours	

Conclusions

The following conclusions are made on the basis of the findings of this research study.

1. A substantial number of science-related instructional objectives are included in the Basic Program of Vocational Agriculture in Louisiana.
2. The Basic Program of Vocational Agriculture in Louisiana contains science-related objectives in both levels of instruction, Vocational Agriculture I and Vocational Agriculture II.
3. The Basic Program of Vocational Agriculture in Louisiana includes overlapping objectives with each of the state-approved science courses.
4. The most commonality between vocational agriculture instructional objectives and science objectives is in the state approved course, Environmental Science.
5. Louisiana vocational agriculture teachers are teaching subject matter similar to science teachers in the public schools.

APPENDIX



School of Vocational Education
and Technology
College of Agriculture

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803-5422
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MEMORANDUM

To: Selected Vocational Agriculture Teachers

From: *Jeff Moss*
Jeff Moss, Assistant Professor
School of Vocational Education and Technology

Re: Survey of Science-Related Agricultural Competencies
Taught in Vocational Agriculture in Louisiana

The Louisiana State Department of Education has funded a project to identify instructional objectives in the Basic Program of Vocational Agriculture in Louisiana that are science-related and to determine the amount of time spent in science-related vocational agriculture instruction. A number of possible science-related objectives have been identified by the research project staff and are listed on the enclosed questionnaire.

Your input is needed to validate the existing list of science-related objectives and to suggest any additional science-related objectives that you teach in your vocational agriculture program. Additionally, you are asked to provide an estimation of the time spent teaching science-related objectives.

The questionnaire should take you approximately ten to fifteen minutes to complete. Please return your completed survey instrument in the enclosed stamped envelope. Your cooperation will be greatly appreciated.

Thank you for your assistance. The information you are providing will help to improve vocational agriculture in Louisiana.

Identification of Science-Related Instructional Objectives in the
Basic Program of Vocational Agriculture in Louisiana
 (Vocational Agriculture Survey)

The purpose of this survey instrument is to collect information to identify science-related instructional objectives taught in Vocational Agriculture I and Vocational Agriculture II (The Basic Program of Vocational Agriculture in Louisiana). The basic curriculum guide was reviewed by the research project staff and possible science-related lesson topics and objectives are listed on the questionnaire. Please rate each objective as it relates to the following:

1. Agree or Disagree that the lesson topic/objective is science-related
2. Estimate time spent teaching the lesson topic if science-related;
 (estimate time to the nearest 1/2 hour).

Please add any science-related lesson topics or objectives that you teach that are not listed on the questionnaire.

Lesson topic/objective	Science-Related		Time spent teaching lesson
	Agree	Disagree	
EXAMPLE 1. List chemical properties of soil 2. State the primary aim of the FFA	✓	✓	(1/2) hours
UNIT: ORIENTATION TO VOCATIONAL AGRICULTURE			
Farming Types in U.S.----- List farming types found in Louisiana and U.S. State approximate acreage for producing different crops Other _____			----- () hours
UNIT: AGRICULTURAL LEADERSHIP - NO OBJECTIVES IDENTIFIED			
Other----- _____ _____			----- () hours
UNIT: SOIL SCIENCE			
Definition of Soil----- Define soil Distinguish between surface and subsoil Identify main soil areas Describe a soil profile Identify various soil horizons			----- () hours

Lesson topic/objective	Science-Related		Time Spent Teaching Lesson
	Agree	Disagree	
Composition of Soil ----- Identify the components of soil and factors that determine its productivity			() hours
Factors Affecting Soil Formation ----- Describe soil formation List factors responsible for soil formation Name factors of most influence on soil formation			() hours
Physical Properties of Soils ----- Interpret organic matter content Interpret internal drainage Distinguish between "light" and "heavy" soil Determine texture of soil sample Classify soil sample Explain effects of structure on productivity			() hours
Chemical and Biological Properties ----- of the Soil List chemical and biological properties Explain how chemical/biological properties affect each other Name the microorganisms in soil List beneficial microorganisms Describe role of plant life in soil			() hours
Soil Acidity and Alkalinity ----- Make chart of pH scale Make lab tests for acidity Explain how calcium affects soil acidity Explain pH symbols Describe conditions for soil acidity/alkalinity List pH ranges of major crops			() hours
Soil Classification ----- State management practices to obtain proper soil conservation Determine best possible use of land according to soil factors			() hours

Lesson topic/objective (cont.)	Science-Related		Time Spent Teaching Lesson
	Agree	Disagree	
Organic and Inorganic Fertilizers ----- List sources of inorganic fertilizers List sources of organic fertilizers Describe nitrogen cycle Explain how plants obtain elements Explain where energy comes from in nitrogen transformation Name one type of bacteria in nitrogen cycle Discuss symbiosis and nitrogen fixation			() hours
Classification - Water Holding Capacity ----- of Soils Demonstrate water holding capacity Determine soil water availability List ways available water is lost Name factors important in water movement			() hours
Other ----- _____ _____			() hours
UNIT: ENVIRONMENTAL PROTECTION			
Safe Use of Chemicals ----- Identify reasons for using chemicals safely List ways chemicals can harm the environment List ways chemicals move through the environment Define residues Define tolerances			() hours
Other ----- _____ _____			() hours
UNIT: CAREER INFORMATION: NO OBJECTIVES IDENTIFIED			
Other ----- _____ _____			() hours

Lesson topic/objective (cont.)	Science-Related		Time Spent Teaching Lesson
	Agree	Disagree	
UNIT: ENERGY CONSERVATION: NO OBJECTIVES IDENTIFIED			
Other -----			() hours

UNIT: AGRICULTURAL MECHANICS			
Electrical Terms -----			() hours
Define electrical terms			
Name the two basic types of circuits			
Identify the types of conductors and insulators			
UNIT: PLANT SCIENCE			
Structure and Physiology of Plants -----			() hours
Define new plant science terms			
List parts of the plant and identify their function			
Plant Nutrition -----			() hours
Identify the three primary elements and function in plant growth			
Identify different conditions of plant when fertilizer is lacking			
Environmental Factors Affecting Plants -----			() hours
Describe components of plants underground			
Describe components of plants above ground			
List optimum growth conditions for different plants			
Weed Control -----			() hours
List and discuss the reason weeds are harmful			
Identify safety precautions when using herbicides			
List general precautions for mixing herbicides			

Lesson topic/objectives (cont.)	Science-Related		Time Spent Teaching Lesson
	Agree	Disagree	
Insects Affecting Plants ----- Identify harmful insects and discuss destructiveness List characteristics of major groups of insecticides by chemical make-up			() hours
Seed and Plant Selection ----- Describe the history of crop improvement			() hours
Diseases Affecting Plants ----- Recognize and describe the symptoms and effects of plant diseases			() hours
Other ----- _____			() hours
UNIT: ANIMAL SCIENCE			
Parts of Livestock and Poultry ----- Identify by name the various parts of livestock and poultry Identify by location the various parts of livestock and poultry			() hours
Classification and Functions of Nutrients ----- List the six classes of nutrients Identify the function of nutrients			() hours
Sources of Nutrients ----- Outline the classification and nomenclature of feedstuffs Identify the sources of feedstuffs representing essential elements			() hours
The Digestive Process ----- Label and define essential parts of the digestive system			() hours
Reproduction of Livestock and Poultry ----- List the anatomy and functions for the male and female			() hours
Other ----- _____			() hours

PLEASE WRITE ADDITIONAL COMMENTS CONCERNING
SCIENCE-RELATED INSTRUCTION PROVIDED THROUGH
YOUR VOCATIONAL AGRICULTURE PROGRAM

PLEASE RETURN TO: Jeffrey W. Moss
School of Vocational Education
135 Old Forestry Building
Louisiana State University
Baton Rouge, LA 70803

THANK YOU FOR PARTICIPATING IN THIS STUDY